EVALUATION METHODS AND CRITERIA FOR RECOMMENDED ALIGNMENT SELECTION

HAMILTON-WENTWORTH RAPID TRANSIT PROJECT

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REFINED METHODS AND CRITERIA FOR ALIGNMENT SELECTION

1.0 INTRODUCTION

This document is intended to serve two major purposes:

a) The presentation of the methods to be used to select a single recommended alignment for the rapid transit system;

b) The presentation of the criteria to be employed in the comparative analysis and evaluation of the four shortlisted alternative alignments.

Originally it had been anticipated that the shortlisting procedure would reduce the number of alignment alternatives to four. However, the relatively late inclusion of a Fennell Avenue option for connecting Upper Wentworth and Upper Wellington Streets and the extreme complexity of the alignments in the downtown area meant that it was not possible to reach the point of four separate end-to-end alignments during the shortlisting stage. As a result the first stage of the alignment selection stage will be the analysis and evaluation of four sets of options associated with the four major alignment alternatives. Once these options are resolved it will be possible to proceed to the comparative analysis and evaluation of the major alignment alternatives.

This document is divided into two major parts. The first part addresses the methods to be used in the generation, organization, analysis and evaluation of the options and alignment alternatives. The second part identifies the selected criteria and related considerations to be used in the analysis and evaluation of options and alignment alternatives.

2.0 EVALUATION METHODS

2.1 Level of Detail

It had originally been assumed that the methods and criteria, which would be used to select an alignment, would be substantially more detailed than those employed in the shortlisting process. The necessity of analyzing alignments on a segmental basis, rather than a comparative analysis of twelve complete alignments, however, had a number of level of detail implications.

As the number of alternatives for individual segment analysis was reduced, the need to simplify the comparative analyses to identify critical tradeoffs was lessened. Thus the methods for reducing complexity (Section 2.4 of Report HW-1-4.0, Evaluation Methods and Criteria for Shortlisting Alignments) were not needed to the same extent. It will, however, be nexessary to apply such methods in the comparative evaluation of the four shortlisted alignments, because of the large number of criteria which will be employed.

In addition, the short length of the segments meant that in order to identify major differences among segments, a somewhat greater level of detail was necessary for the analysis and evaluation of alternatives. This requirement applied particularly to property access, effects resulting from proximity to uses, visual integration and service relocations. As the analysis of options and the four way comparative analyses will be conducted using the same scale of maps (1:200) and will employ similar design assumptions as the segment analyses, much of the data employed in the shortlisting process can

be incorporated directly into the analyses and evaluation of alignment options.

There will, however, be some design refinements for the four way comparative analysis including:

- minor refinements in terms of street side, station sites, bus routes and profiles;

- further consideration of station types; e.g. basic design, pedestrian and vehicular connections, property requirements;

- further consideration of issues related to fire and safety access;

- further consideration of engineering and design matters related to the tunnels, particularly in the vicinity of the tunnel portals;

- further consideration of the limits to which structures can be modified to minimize adverse effects and enhance development opportunities.

The level of detail of the option analyses will be equivalent to that of the segment analyses. In the subsequent analysis the fact that four complete alignments will be considered will mean that considerably more attention can be devoted to ridership, surface transit interface, and capital and operating costs and performance. In addition, the design refinements will mean that somewhat greater attention can be devoted to such detailed considerations as overshadowing, visual integration, construction disruption and natural environmental effects.

2.2 Criteria Generation

A cylical procedure was employed to generate appropriate criteria for each set of options and for the shortlisted alignment alternatives. In each case the analysis reports produced by the various consultant teams, the previous evaluation documents (particularly Report HW-1-3.9, Evaluation Framework and Preliminary Criteria and Report HW-1-4.9, Evaluation Methods and Criteria for Shortlisting Alignments, 3 March 1981), general transit impact literature, reports on comparable projects and previously expressed concerns identified by elected representatives, interest groups and members of the general public were reviewed and a preliminary list of criteria prepared. Where appropriate comments were included describing considerations which might be addressed in applying each criterion.

The preliminary list of criteria were reviewed by Metro Canada and the other study teams. Appropriate modifications were made to the preliminary list and the selected list of criteria were circulated to the members of the other study teams. Feedback from the application of the criteria to each successive set of options was employed to refine and adapt the criteria for subsequent sets of options and for the criteria to be used in the four way comparative analysis and evaluation.

2.3 Criteria Organization - Options

The basic organization of the criteria for the analysis of the options was essentially the same as that employed in the segment analysis.

The criteria were grouped under four headings; transportation, land use and environment, capital costs and staging. The transportation criteria were further subdivided into criteria which applied to; the ICTS; e.g. travel time, ridership, ancillary facilities; e.g. maintenance yard, surface transit interface; e.g. buses, trolleys, roads; e.g. road capacity, intersecting roads, pedestrian movement; e.g. along and across the right-of-way, property access; e.g. restrictions to visibility, access from one direction only and on-street parking.

A distinction was drawn in the land use and environmental criteria between alignment and station-related effects, as the type of effects associated with each, tend to be somewhat different. It was also felt that if severe impacts were associated with the alignment or stations for a particular option, it would be easier to analyze the implications of modifying the station or alignment design or location.

Within the land use and environmental set of criteria, further distinctions were drawn in terms of the displacement of uses; e.g. public open space, institutional, residential, businesses, proximity to uses, development-redevelopment, natural environmental effects; e.g. trees displaced, drainage impacts and construction-related effects; e.g. road system, land use, environmental.

The capital cost criteria were intended to include; preliminary property acquisition costs, utility relocations, infrastructure costs and a range of other directly and indirectly related costs.

Where appropriate, consideration was also given to flexibility for staging and flexibility for expansion.

The material is presented in three columns. The first column indicates the major criteria and subcriteria. The second column provides a more detailed list of indices for measuring the relative differences in criteria achievement. The third column includes relevant comments concerning procedures and considerations in applying the criteria. Recognizing the need for some flexibility in applying the indices in a site-specific context, the indices were kept fairly general. In this way the consultant teams were left with sufficient discretion to adjust the indices to respond to the detailed issued and concerns which would arise during the course of analysis.

2.4 Criteria Applications - Options

The process of analyzing and evaluating the alignment options should also proceed in a cyclic fashion. The suggested sequence of options would be; Mohawk/Fennell Square, CBD loops and stub ends, and the John-Hughson segments.

In each case it is suggested that the analysis and evaluation proceed through the following stages:

- initial screening for transit feasibility; i.e. Can the option function as a viable component of a rapid transit system? If the segment does not make "sense" from a transit system's perspective, associated costs and impacts are immaterial;

- overview of major costs and impacts with no offsetting benefits (this approach is discussed in greater detail in Section 2.4.6 of Report HW-1-4.0, Evaluation Methods and Criteria for Shortlisting Alignments);

- detailed analysis of options by consulting teams;

- evaluation of analysis by Metro Canada with input from consulting teams;

- input from Technical Advisory Committee, Steering Committee, Regional Council and public.

The analysis and evaluation of the Mohawk/Fennell Square and the John-Hughson options is relatively straight forward. The treatment of the CBD loops and stub ends is somewhat more complex. The initial question would appear to be whether a loop or a stub end in the downtown is feasible. If both appear to be feasible, comparing the three loops against one another or the four stub ends against one another, in isolation from the four alignments would not be a desirable strategy; because many of the impacts and costs associated with the loops and alignments, occur at the point of connection with the alignments.

A straight comparison of the loop alignments and stub end alignments would, however, be difficult to manage as there are 28 such combinations. The following sequential evaluation procedure is therefore, suggested:

1. - feasibility of loops,
   - feasibility of stub ends.

2. - comparative analysis and evaluation of loops for *w* alignment, then *x* alignment, then *y* alignment, then *z* alignment,

   - comparative analysis and evaluation of stub ends for *w* alignment, then *x* alignment, then *y* alignment, then *z* alignment.

3. - comparative analysis and evaluation of selected stub end and selected loop for w alignment, x alignment, y alignment and z alignment.

2.5 Criteria Organization - Shortlisted Alignments

The general organization of the criteria for the shortlisted alternatives is consistent with that for the analysis of options. There are, however, a diversity of concerns which must be analyzed for the four alignments. There is, therefore, a serious danger that a very large number of criteria would make the analysis extremely difficult to undertake and virtually impossible to present to political representatives and the public. There is also a need to ensure that a balance is struck between identifying potential concerns which the consultant teams should be prepared to address and permitting sufficient flexibility in the criteria to permit adaptations to site-specific conditions.

Recognizing these potential problems, the approach which was adopted was to identify in the indices column potential concerns which should be addressed and then to list a large number of qualitative and quantitative considerations which might be employed in addressing the identified concern.

In this way the number of criteria were kept to manageable proportions, a broad range of potential considerations in the analysis were raised and the consulting teams were left with sufficient flexibility to adapt the indices during the course of their analyses.

2.6 Criteria Application - Shortlisted Alternatives

It is assumed that the end product of the analysis will be summary tables identifying the major differences among the four alignments. To support the information and conclusions contained in the tables, it is further assumed that there will be a need for text which discusses methodology, outlines the rationale for assumptions and elaborates on the material contained in the tables.

As the tables will address overall considerations for each of the alignments, there will also be a need for disaggregated site-specific data which can respond to specific concerns and issues. These data could be recorded on working tables and maps. In addition, it would be desirable to have display maps prepared for each of the alignments, which could, through a combination of notations and symbols, identify potential problem areas and design opportunities along the entire alignments. These display maps, in combination with summary tables, would be very useful for presentations to Regional staff, committees, politicians and the public.

In undertaking the analysis it is important that the following general considerations be borne in mind:

- consistent and appropriate level of detail,
- reponsiveness to concerns of municipal staff, elected representatives and public,
- methods of gathering data and data sources specified,

- potential for overcoming or significantly reducing adverse impacts or for enhancing possible benefits through minor changes in design or construction procedure identified,

- areas of uncertainty or risk identified,

- the use of sensitivity analyses in any instance where a small change in assumptions could lead to significantly different results.

Even with the approach adopted to organizing the criteria, the large number of criteria will make it difficult to identify the critical tradeoffs among the four alignments. A variety of techniques are, therefore, suggested for facilitating the comparative evaluation including:

- eliminating criteria where the differences among alternatives are negligible,

- eliminating criteria where the impacts for all four alignments are insignificant,

- grouping criteria which are essentially measuring different aspects of a single area of concern (providing tradeoffs within criteria are not masked),

- ranking criteria on the basis of magnitude, technical priority and political and public concern,

- focusing the impact analysis on those portions of the alignment which are different (three of the alignments share common route segments),

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- the use of scaling techniques to demonstrate the extent of differences among alternatives.

A fuller description of these techniques is contained in Section 2.4 of Report HW-1-4.0 Evaluation Methods and Criteria for Shortlisting Alignments.

3.0 ALIGNMENT OPTION EVALUATION CRITERIA

3.1 ALIGNMENT OPTION EVALUATION CRITERIA: MOHAWK/FENNELL SQUARE

INTRODUCTION

This section provides an annotated list of the criteria to be used in the evaluation of Options 1 and 2 of Alignments X, Y, and Z.

SELECTED CRITERIA - MOHAWK - PENNELL SQUARE

	CRITERIA	COMMENTS
Transportation		
- Travel Time	. peak	
- Ridership	. peak hour ridership for 1986 and 2000	
	. number of major existing and committed activity centres within distance x	
- Suitability for Ancilliary Facilities	. analysis of adequacy of station sites for ancilliary facilities e.g. parking, park and ride	. applies only for interim period
- Bus Interface	. net difference in bus miles	
	. analysis of relative ease with which facility can be integrated with bus system	
- Interface-Roads	. reduction in road capacity	
	. analysis of relative differences in impairment of access to intersecting roads	
- Property Access	. number of residential entrances and driveways where visibility restricted	
	. number of business entrances and driveways where visibility restricted	

	CRITERIA	COMMENTS
Transportation - (cont'd)		
	. number of homes - access only possible from one direction	
	. number of businesses - access only possible from one direction	
	. number of public uses - access only possible from one direction	
- Parking	. number of off-street parking spaces removed	
Alignment - Land Use and Environment		
- Displacement of Uses	. acres of non transportation - related uses displaced	. analysis of relative significance
	. acres of private property displaced (by type) and number of property owners affected	. concern applies to air rights only; analysis of relative significance
- Proximity to Uses	. number of housing units adjacent to right-of-way	
	. distance adjacent to open space and recreational uses	. distinction - front, rear and side
	. number of residential properties, ground-oriented and up to the third floor level within 100 feet	

	CRITERIA	COMMENTS
Alignment - Land Use and Environment - (cont'd)		
	. number of dwelling units subject to overshadowing	. analysis of relative severity of effects
	. number of businesses subject to overshadowing and interference with views to signs and building numbers	. analysis of relative severity of effects
	. relative ease with which facility can be integrated with streetscape	
	. analysis of relative obstruction of views to cultural facilities e.g. churches	
- Natural Environment	. number of trees, by type and significance, displaced	
	. number of trees indirectly affected e.g. overshadowing, root compaction, etc. by operations	
	. analysis of relative differences in effects upon drainage and soils	
- Construction	. relative severity of construction disruption to road system	
	. relative severity of construction disruption to homes	. considerations include noise, dust, property access, service disruption in terms of both uses affected and duration of effects
	. relative severity of construction disruption to businesses	

	CRITERIA	COMMENTS
Alignment - Land Use and Environment - (cont'd)		
	. relative severity of construction disruption to public uses	
	. relative severity of environmental effects of construction	
Stations - Land Use and Environment		
- Displacement of Uses	. number of housing units displaced	. consideration of number of people displaced and type of dwellings
	. number and type of public facilities wholly or partially displaced	. special consideration to social and economic groups, such as the elderly and people on low incomes, who are most sensitive to change
	. degree of disturbance to individual recreational activities within open space areas	. analysis of relative significance
	. number of businesses wholly or partially displaced	
- Proximity to Uses	. relative ease of integration with adjacent uses	
	. analysis of relative differences in potential for increasing on-street parking	. interim period only

	CRITERIA	COMMENTS
Stations - Land Use and Environment (cont'd)		
- Natural Environment	. number of trees, by type and significance, displaced	
	. number of trees indirectly affected e.g. overshadowing, root compaction	
	. analysis of relative differences in effects upon drainage, soils, etc.	
- Development/Redevelopment	. analysis of relative potential for development or redevelopment in close proximity to stations	
- Construction	. relative severity of construction disruption to homes	
	. relative severity of construction disruption to businesses	
	. relative severity of construction disruption to public uses	
	. relative severity of environmental effects of construction	
Capital Cost	. total estimated capital costs	. includes property acquisition, utility relocations, infrastructure costs, etc.
Staging	. analysis of relative differences in potential for incremental implementation	. includes consideration of bus interface and ancilliary facilities

Note: Overview of transit dependent groups (from broad population statistics).

3.2 ALIGNMENT OPTION EVALUATION CRITERIA: DOWNTOWN ROUTING

INTRODUCTION

This section provides an annotated list of the criteria to be used in the evaluation of downtown routing options for Alignments W, X, Y, and Z.

SELECTED CRITERIA - DOWNTOWN ROUTING

Criteria	Indices	Comments
Transportation	. operational considerations	. includes considerations of headways, system capacity, loading and unloading
Travel time	. peak	
Ridership	. percentage of existing transit ridership within 1300 feet of stations	
	. number of existing activity centres within distance x	
	. analysis of relative potential for development or redevelopment in close proximity to stations	. includes consideration of official plan designations, zoning, development proposals, vacant land suitable for development, ease of potential connections
Maintenance Yards	. length and ease of access to potential maintenance yard	
Surface Transit Interface	. net difference in passenger convenience	
	. analysis of relative ease with which facility can be integrated with bus system	
	. analysis of relative difference in impact on operation of trolley bus system	
	. potential to serve future intercity bus terminal	. considerations - potential sites
Interface - Roads	. reduction in road capacity	. interpretation of relative significance
	. impairment of access to intersecting roads	

Criteria	Indices	Comments
Interface - Pedestrian Movement	. analysis of relative effects on pedestrian movement . relative ease of integration with Plus 15 system	. interpretation of relative significance - consideration of width of sidewalk remaining, volume and direction of pedestrian movement, interference with movements along and across streets
Property Access	. number of public use entrances and driveways where visibility restricted	
	. analysis of relative disruption to business operations (from access limitations)	. includes consideration of principal and secondary entrances, access to loading and storage areas, delivery access, implications if roads closed, building maintenance access, taxi loading areas
	. analysis of relative disruption to public use operations (from access limitations)	
	. number of on street parking space removed	
Alignment		
Displacement of Uses	. number and type of businesses, wholly or partially displaced and type	. interpretation of relative significance; includes situations where overhanging signs, awnings, etc. a major consideration and removal of off-street parking spaces
	. number of public uses, wholly or partially displaced	
	. number and type of historic or cultural buildings, facilities or landmarks displaced	
	. distance through public open space	
	. acres of public open space displaced	

Criteria	Indices	Comments
	. acres of non-transportation related public uses displaced	
	. acres of private property displaced (by type) and number of property owners affected	
Proximity to and Interaction Among Uses	. distance adjacent to open space and recreational uses	
	. number of public uses and facilities adjacent to	. front, back or side
	. number of historical and cultural facilities adjacent to	. interpretation of significance
	. number of feet adjacent to architecturally significant district	
	. distance adjacent to offices (2nd and 3rd floor levels) within 50 feet	
	. analysis of effects of overshadowing and shelter on public open spaces, sidewalks, and public uses and facilities	. includes consideration of relative differences in development opportunities for public spaces
	. number of businesses subject to overshadowing, shelter and interference with views to signs and buildings, numbers	. includes considerations of relative differences in business opportunities
	. relative ease with which facility can be integrated with streetscape	. would include, for example, compatibility with axial symmetry of Gore Park

Criteria	Indices	Comments
	. analysis of relative obstruction of views to cultural and historical facilities and landmarks, e.g. monuments in Gore Park	
	. analysis of degree to which views obstructed along major visual corridors	
Natural Environment	. number of trees, by type and significance, displaced	
	. number of trees indirectly affected, e.g. overshadowing	
Construction	. relative severity of construction disruption to road system	
	. relative severity of construction disruption to surface transit system	. trolley bus operations a particular concern
	. relative severity of construction disruption to pedestrian movement	
	. relative severity of construction disruption to public uses	
	. relative severity of construction disruption to businesses	
	. relative severity of environmental effects of construction	

Criteria	Indices	Comments
Stations - Land Use and Environment		
Displacement of Uses	. number and type of public use wholly or partially displaced	
	. number and type of historic or cultural buildings, facilities or landmarks displaced	
	. acres of public open space displaced	
	. analysis of degree of disturbance to individual recreational activities within public open space displaced	
	. acres of public property displaced	
	. acres of private property displaced (by type) and number of property owners affected	
Proximity to Uses	. relative ease of integration with adjacent uses	
Natural Environment	. number of trees, by type and significance, displaced	
	. number of trees indirectly affected	
Construction	. relative severity of construction disruption to public uses and cultural and historically significant buildings, facilities and landmarks	

Criteria	Indices	Comments
	. relative severity of construction disruption to businesses . relative severity of environmental effects of construction	
Costs	. total estimated costs	

3.3 ALIGNMENT OPTION EVALUATION CRITERIA: SOUTHERN ACCESS

INTRODUCTION

This section provides an annotated list of the criteria to be used in the evaluation of options available for the southern access into the downtown for Alignments W and X.

SELECTED CRITERIA:
SOUTHERN ACCESS

CRITERIA	INDICES	COMMENTS
Transportation		
Travel Time	• peak and off-peak	
Maintenance Yard	• length and ease of access to potential maintenance yard	
Interface Roads	• reduction in road capacity • impairment of access to intersecting roads	
Interface-Pedestrian Movement	• analysis of relative effects on pedestrian movement	• consideration of width of sidewalk remaining, volume and direction of pedestrian movement, interference with movements along and across streets

CRITERIA	INDICES	COMMENTS
Transportation - cont'd.		
Ridership	walk in considerations	population within walking distance, adjacent land uses, (existing, committed), number of stations, official plan designations, zoning, development proposals, vacant land suitable for development, ease of pedestrian connections, population characteristics
Suitability for Ancillary Facilities	adequacy of station sites for ancillary facilities	considerations - bus loops, kiss and ride, parking
Surface Transit Interface	net difference in passenger convenience	considerations - number and ease of transfer, differences in length of road sections served, populations served as a result of reroutings, changes in travel time for buses, modal splits, bus headway times, distance from stations platform to bus loading area
	relative ease of integration with bus system	considerations - length of bus reroutings required (peak hour bus miles) relative consistency with surface transit improvement plans

CRITERIA	INDICES	COMMENTS
Transportation - cont'd		
Property Access	• number of residential entrances and driveways where visibility restricted	
	• number of public use entrances and driveways where visibility restricted	
	• analysis of relative disruption to public use operations (from access limitations)	
	• number of business entrances and driveways where visibility restricted	
	• analysis of relative disruption to business operations (from access limitations)	• includes consideration of principal and secondary entrances, access to loading and storage areas, building maintenance access, etc.
	• number of homes - access only possible from one direction	
	• number of businesses - access only possible from one direction	
	• number of public uses - access only possible from one direction	
	• number of on-street parking spaces required	

CRITERIA	INDICES	COMMENTS
Alignment		
Proximity to Uses	. number of housing units adjacent to right-of-way	. distinction - front, rear and side
	. number of residential properties, ground-oriented and up to the third floor level within 100 ft	
	. number of dwelling units subject to overshadowing	
	. number of public uses and facilities adjacent to	. interpretation of significance
	. number of historical and cultural facilities adjacent to	
	. analysis of effects of overshadowing and shelter on sidewalks and other public spaces, uses and facilities	
	. distance adjacent to offices (2nd and 3rd floor levels) within 50 ft	
	. number of businesses subject to over-shadowing, shelter and interference with views to signs and building numbers	
	. relative ease with which facility can be integrated with streetscape	
	. analysis of relative obstruction of views to cultural and historical facilities and landmarks, e.g. church	
	. analysis of degree to which views obstructed along major visual corridor	. view to escarpment

CRITERIA	INDICES	COMMENTS
Alignment - cont'd		
Development/ Redevelopment	• analysis of relative potential for development/redevelopment along corridor	• on positive side includes consideration of zoning, official plan designations, development proposals and vacant land (possible measures - distance adjacent - high/medium/low development potential and zoning) • on negative side - restrictions on access such that entrances must be on minor east-west street - result - reduced development potential
Natural Environment	• number of trees, by type and significance, displaced • number of trees indirectly affected	
Construction	• relative severity of construction disruption to road system • relative severity of construction disruption to pedestrian movement • relative severity of construction disruption to public uses • relative severity of construction disruption to businesses • relative severity of environmental effects of construction • impact upon dwelling units	
Capital Costs	• total estimated capital costs	

Stations

CRITERIA	INDICES	COMMENTS
Displacement of Uses	number and type of public uses displaced	public facilities - type, service area, relative mobility of groups served, facilities, removal of off-street parking (relative importance to public use); loss of air rights, whether results in a deficiency of a capacity, potential for pedestrian and vehicular connections
Natural Environment	number of trees, by type and significance, displaced or affected	considerations - extent, diversity, uniqueness and continuity of vegetation, age, height, and species type, continuity and productivity of habitat
Construction	relative severity of construction disruption of road system	considerations - length of road right-of-way required during construction, duration of construction, number of lanes removed during construction, traffic volumes, on-street parking - number of spaces, type of land use and relative dependence on on-street parking

Stations

CRITERIA	INDICES	COMMENTS
	relative severity of construction disruption to pedestrian movement	considerations - length and width of sidewalk, width of sidewalk remaining, volume and direction of pedestrian movement, existing uses along road, potential for and length of temporary diversions
	relative severity of construction disruption to homes	considerations - noise, dust, vibration, property access, service disruptions, affected uses, duration of effects
	relative severity of construction disruption to public uses	considerations - noise, dust, vibration, property access, service disruptions, degree of disturbance to individual recreational activities within open spaces affected, type of uses affected, temporary removal of parking, duration of effects
	relative severity of environmental effects of construction	considerations - effects on vegetation, disturbance to drainage, potential for erosion, slumping, sedimentation, groundwater effects

STATIONS CRITERIA	INDICES	COMMENTS
Proximity to Uses	number of dwelling units, and other sensitive uses, within distance x of stations	considerations - increased noise levels from buses entering or leaving stations, overshadowing, lighting from station, vibration, loss of privacy (orientation of house), interface with views to signs or building numbers
	impact on local streets	considerations - distance along local streets which would be used by feeder buses, potential increase in traffic on local streets, potential for increased on-street parking
	ease with which stations can be integrated with abutting uses and streetscape	considerations - as per alignment

Stations

CRITERIA		INDICES	COMMENTS
		obstruction of views	considerations - views to escarpment, views along major visual corridors, views to cultural and historical facilities and landmarks, views from public areas or private uses (number of dwelling units affected) fractions of views obstructed, length of disrupted view
	Development or Redevelopment	relative potential for development or redevelopment in close proximity to stations (and alignment in downtown)	considerations - Official Plan designations, zoning, potential community impact of additional development, land availability, e.g. parking areas of shopping centres, vacant land, development proposals, property access, availability of services, ownership pattern, road

4.0 RECOMMENDED ALIGNMENT EVALUATION CRITERIA

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RECOMMENDED ALIGNMENT EVALUATION CRITERIA

CRITERIA	INDICES	COMMENTS
Transportation		
Travel time	. peak travel time	. considerations - length, curvature, grade
Ridership peak	. peak hour ridership - 1986 and 2000 . daily ridership - 1986 and 2000 . other possible indices: - revenue passenger/revenue mile - yearly ridership/vehicle mile	. considerations in ridership forecasts: walk-in and transfer; existing, planned and potential with development or redevelopment . walk-in considerations:- - population within walking distance, adjacent land uses, (existing, committed) number of stations, official plan designations, zoning, development proposals, vacant land suitable for development ease of pedestrian connection population characteristics . considerations in transfers - centrality, desire lines, bus ridership, regional access . other general considerations if downtown service not the same; number of downtown employment centres served, downtown employment service, percentage of downtown destinations within distance x

CRITERIA	INDICES	COMMENTS
Service to Activity Centres	. number of existing and committed activity centres within close proximity to stations	. activity centres - institutional, recreational & entertainment not sources of employment or residences
Quality of View	. qualitative analysis	. considerations - variety, sequence, orientation, surpri uniqueness
Suitability for Ancillary Facilities	. adequacy of station sites for ancillary facilities	. interim period only
	. adequacy of alignment for ancillary facilities	. considerations - bus loops, kiss and ride, parking
	. length and ease of access to potential maintenance and storage yard	. considerations - service road existing uses, land availabil
Surface Transit Interface	. net difference in passenger convenience	. passengers perspective - considerations - number and e of transfer, differences in length of road sections serve population served as a result reroutings, changes in travel time for buses, distance from stations platform to bus load area
	. relative difference in impact on bus system	. operations perspective - moda split, bus headway time, consistency with surface transit improvement plans
	. potential to serve future intercity bus terminal	. considerations - potential sites

CRITERIA	INDICES	COMMENTS
Interface Roads	. relative change in road capacity	. considerations - length of pavement narrowed, road allowance, maintenance, access requirements, traffic volumes, potential for increase in traffic on parallel streets - interpretation of implications
	. impairment of access to intersecting roads	. considerations - number of left turn restrictions by media volumes of left turn movements, alternative access points, volu function, character and capacit of intersecting roads, number o local street closings, length o diversions of cross streets
Interface - Pedestrian Movement	. effects on pedestrian movement along alignment	. considerations - length and wid of sidewalk, width of sidewalk remaining, volume and direction of pedestrian movement, existin uses along road, potential for providing arcade, potential for providing new walkways, walking paths made more indirect
	. effects on pedestrian movement across right-of-way	. considerations - length (at grade) where barrier to movement, amount of cross movement, alternate access routes, length of alternative access routes

CRITERIA	INDICES	COMMENTS
Property Access (to or from)	. impairment of access to or from residences (pedestrian and vehicular)	. considerations - number of residential entrances and driveways where visibility restricted, number of homes where access only possible from one direction
	. impairment of access to businesses (pedestrian and vehicular)	. considerations - principal a secondary entrances, access to loading and storage areas delivery access, building maintenance, taxi loading ar type of business (small sing owner retail stores and serv stations more vulnerable), service area, disruption to functionally related uses, s ration of incompatible uses, relative importance of acces to business
	. impairment of access to and from public uses and facilities	. considerations - primary acc routes to community facilitie e.g. schools, churches, comm nity centres, local parks, medical centres, made more i or otherwise disrupted, degr impairment to/from emergency facilities, e.g. police stat fire stations, hospitals, ch in number of people within x minutes driving time of emer facilities

CRITERIA	INDICES	COMMENTS
	. impairment of parking	. considerations - number of on-street parking spaces removed, type of land use and relative dependence on on-street parking
Social, Environmental and Land Use		
Displacement of Uses	. number and type of housing units displaced	. considerations - whole or partial displacement, owner-occupied or rental, acreage, use of displaced property, historical, architectural, or cultural significance, number of persons displaced, potential hardships in relocations, e.g. aged, long time residents low income, ethnic communities
	. extent of designated residential land displaced	. considerations - area, configuration, development suitability and potential, intensity, Offic Plan designation, zoning, development proposals, access
	. number and type of businesses displaced	. considerations - potential problems associated with relocation, e.g. small local retail operation - owned by operator, removal of off-stree parking (relative importance to business), loss of air rights, number of jobs displac removal of overhanging signs, awnings etc., architectural or cultural significance, number owners, tenants affected

CRITERIA	INDICES	COMMENTS
	. extent of designated commercial or industrial lands diplaced	. considerations - area, configuration, development suitability and intensity, Official Plan designation, zoning, development proposals, access (pedestrian and vehicular)
	. number and type of public uses displaced	. considerations - open space - acreage, distance through, degr of disturbance to individual recreational activities within open space areas displaced, whether results in a deficiency of open space of a particular type as defined by municipal standards, potential for and cost of replacement public facilities - type, service area relative mobility of groups served, facilities, architectural, archaeological, historical and cultural significance removal of off-street parking (relative importance to public use); number of jobs displaced, number of uses affected, remova of overhead signs, etc., loss o air rights, whether results in deficiency of a particular type as defined by Provincial or Municipal standards, potential for and cost of replacement

CRITERIA	INDICES	COMMENTS
	. extent of publicly owned or designated land displaced	. existing use, area, configuration, development suitability, planned or proposed uses, access (pedestrian and vehicular), potential for joint use, e.g. transportation or utility corridors, potentia for replacement
Proximity to Uses	. number of residential properties, ground oriented and up to third floor level within 100 feet and visible from alignment	. considerations - <u>noise and vibration</u> - a factor at portal and vent structures, character and ambient noise levels in affected areas, potential for noise attenuation through design, planting etc. at porta general sensitivity of residential environment, existing tra volumes and road function, potential for conversion to non-residential uses <u>privacy</u> - orientation of homes - front, rear or side yards, angle of overlook, height, distance fro track, speed of train, potential for attenuation, areas where visibility from alignment (more than 100 feet) would be a consideration in te of privacy <u>overshadowing</u> - number of affected units, exte and duration of overshadowing effect, portion of property affected, potential for attenuation

CRITERIA	INDICES	COMMENTS
	. number of businesses within 100 feet and adversely affected	. consideration - orientation front, side, back offices, 2nd and 3rd floor levels and within 50 feet, businesses subject to overshadowing, or interference with view to signs and building numbers, historical, cultural, architectural significance, distinction retail and other types of businesses, potential for arcade - benefit to business, potential for attenuation
	. number and type of public uses and areas within 100 feet and adversely affected	. open space - distance abutting, type and intensity of recreational use, potential for linking public open space areas, potential for attenuation
		. public facilities and areas effect of overshadowing or potential for the provision of shelter/arcade on sidewalks and other public areas and facilities, institutional uses at 2nd or 3rd floor level within 50 feet - consideration of sensitivity of public use, e.g. hospital, nursing home - proximity and outlook of patient's rpoms, architectural, historical or cultural significance, interference with views to signs and building number, orientation - front side, back, potential for attenuation

CRITERIA	INDICES	COMMENTS
	. number of dwelling units, and other sensitive uses, within distance x of stations	. considerations - increas noise levels from buses entering or leaving stations, overshadowing, lighting from station, vibration, loss of privacy (orientation of house) interference with views to signs or building numbers
	. impact on local streets	. considerations - distance along local streets which would be used by feeder buses, potential increase in traffic on local streets, potential for increased on-street parking
	. ease with which alignment of facility can be integrated with streetscape	. considerations - scale, uses, potential for change, development proposals where joint design possible, right-of-way width, building-orientation, age, architectural character, materials, lighting, utilities street furniture, vegetation, etc., existing traffic volume road requirements, axial symmetry; e.g. Gore Park
	. ease with which stations can be integrated with abutting uses and streetscape	. considerations - as per alignment

CRITERIA	INDICES	COMMENTS
	. obstruction of views	. considerations - views to escarpment, views along major visual corridors, views to cultural and historical facilities and landmarks, views from public areas or private uses (number of dwelling units affected) fractions of views obstructed, length of disrupted view
Development or Redevelopment	. relative potential for development or redevelopment in close proximity to stations (and alignment in downtown)	. considerations - Official Plan designations, zoning, potential community impact of additional development, land availability, e.g. parking areas of shopping centres, vacant land, development proposals, property access, availability of services, ownership pattern, road capacity, potential for pedestrian and vehicular connections
Natural Environment	. number of trees, by type and significance, displaced	. considerations - location in public or private property, extent, diversity, uniqueness and continuity
	. number of trees indirectly affected	of vegetation, age, height, and species type, continuity and productivity of habitat
	. relative differences in effects upon drainage and soils	. particular concern with tunnel - groundwater, site drainage, sedimentation
	. relative differences in potential for disturbance of soil stability of escarpment	. considerations - soil type, depth - soil, talus, rock

CRITERIA	INDICES	COMMENTS
Construction		
	. relative severity of construction disruption to surface transit system	. considerations - buses and trolleys, length of re-routing, transit volumes, duration of disturbance
	. relative severity of construction disruption or road system	. considerations - length of road right-of-way required during construction, duration of construction, number of lanes removed during construction, traffic volumes, on-street parking - number of spaces type of land use and relative dependence on on-stre parking
	. relative severity of construction disruption to pedestrian movement	. considerations - length and width of sidewalk, width of sidewalk remaining, volume and direction of pedestrian movement, existing uses along road, potential for and length temporary diversions
	. relative severity of construction disruption to homes	. considerations - noise, dust, vibration, property access, service disruptions, affected uses, duration of effects
	. relative severity of construction disruption to public uses	. considerations - noise, dust, vibration, property access, service disruptions, degree of disturbance to individual recreational activities within open spaces affected, type of uses affected, temporary remov of parking, duration of effect

CRITERIA	INDICES	COMMENTS
	. relative severity of construction disruption to businesses	. considerations - noise, vibration, dust, property access, service disruptions, temporary loss of parking (off-street and on-street) interference with views to signs and buildings, duration of effects
	. relative severity of environmental effects of construction	. considerations - effects on vegetation, disturbance to drainage, potential for erosion, slumping, sedimentation, ground water effects
Costs		
	. total estimated capital costs (1986 and 2000)	. considerations - property acquisitions, utility relocations, special construction problems associated with tunnelling, capital improvements to bus and trolley systems, requirements for major mitigative measures, e.g. for visual intrusion, noise attenuation (portals), property access, business disruption, compensation, infrastructure, structures, stations, track, vehicles, signals and communications, electrification, administration, engineering and planning, property tax loss, potential for conditions such as special approvals and problems with property availability which could lead to implementation difficulties
	. possible index:- - estimated capital cost (construction stages - cash flow analysis)	

CRITERIA	INDICES	COMMENTS
	. other potential distinctions: - net present value (capital - salvage = net) - capital costs by level of government - capital costs minus road and surface transit, improvement costs deferred or no longer required - annual capital costs (1980 dollars at x per cent interest) - capital costs per mile	. intermodal comparison should include analysis of capital costs associated with satisfying demand with conventional bus system . might distinguish at-grade, off-street, off-grade, on-street elevated, tunnel
	. estimated annual operating costs (1986 and 2000)	. considerations - feeder and trunk service, e.g. labour, maintenance, energy, depreciation, claims and insurance, overhead and administration . intermodal comparison should include reference to operating costs of satisfying transit demand with conventional bus system
	. other potential distinctions: Cost - annual operating cost minus savings in bus and road maintenance costs no longer required	

CRITERIA	INDICES	COMMENTS
	- operating cost by level of government	
	Revenue	
	- annual revenues (1986 and 2000)	
	- annual revenue to operating cost ratio	
	Subsidy	
	- annual operating subsidy (1986 and 2000)	
	- subsidy per capita	
	- subsidy per passenger	
	- subsidy per passenger mile	
	- net change in government fiscal flow	revenues less operating expenditures and annualized capital costs
	- ratio of costs borne by fare to property taxes	
	- average annual property tax change	
	Cost Performance	
	- operating cost/passenger	
	- total costs, passenger	
	- operating costs/passenger mile	
	- operating costs/revenue/vehicle mile	

CRITERIA	INDICES	COMMENTS
	- total costs/vehicle hours - travel time savings/cost (hrs./dollars) - costs/vehicle mile	
Staging and Expansion		
• staging-relative differences in potential for incremental staging		• considerations - maintenance and storage yard, potential for provision of ancillary facilities at interim terminu community impacts at interim terminus, system performance in interim period
• upgrading and expansion-relative differences in potential for expanding system		• considerations - route expansion, station expansion, flexibility to respond to changes direction of growth, relative ease with which facility can t integrated with planned, propc or possible adjoining uses